

10/535667

JC06 Rec'd PCT/PTO 19 MAY 2005

SEQUENCE LISTING

<110> Japan Science and Technology Corporation

<120> A Rotary Motor molecule V1-ATPase

<130> 03F044PCT

<140> JP2002-337212

<141> 2002-11-20

<150> PCT/JP2003/012983

<151> 2003-10-09

<160> 5

<170> PatentIn Ver. 2.1

<210> 1

<211> 4199

<212> DNA

<213> Thermus thermophilus

<220>

<221> CDS

<222> (1).. (318)

<220>

<221> CDS

<222> (334).. (2067)

<220>

<221> CDS

<222> (2081).. (3514)

<220>

<221> CDS

<222> (3528).. (4196)

<400> 1

gtg agg atg gcg gtg atc gcc gat ccc gag acc gcc cag ggg ttc cgg 48
Val Arg Met Ala Val Ile Ala Asp Pro Glu Thr Ala Gln Gly Phe Arg

1

5

10

15

ctc gcg ggc ctc gag ggc tac ggg gcc tct tgc gcg gag gag gcc caa	96
Leu Ala Gly Leu Glu Gly Tyr Gly Ala Ser Ser Ala Glu Glu Ala Gln	
20 25 30	
agc ctc ctg gaa acc ctc gtg gag cgg ggc ggc tac gcc ctg gtg gcc	144
Ser Leu Leu Glu Thr Leu Val Glu Arg Gly Gly Tyr Ala Leu Val Ala	
35 40 45	
gtg gac gag gcg ctc ctc ccc gac ccc gag cgg gcg gtg gag cgc ctc	192
Val Asp Glu Ala Leu Leu Pro Asp Pro Glu Arg Ala Val Glu Arg Leu	
50 55 60	
atg cgg ggc agg gac ctc ccc gtg ctc ctg ccc atc gcg ggg ctg aag	240
Met Arg Gly Arg Asp Leu Pro Val Leu Leu Pro Ile Ala Gly Leu Lys	
65 70 75 80	
gag gcc ttc cag ggg cac gac gtg gaa ggc tac atg cgg gag ctg gtg	288
Glu Ala Phe Gln Gly His Asp Val Glu Gly Tyr Met Arg Glu Leu Val	
85 90 95	
agg aag acc atc ggc ttt gac atc aag ctg tagaatggag ggacg atg atc	339
Arg Lys Thr Ile Gly Phe Asp Ile Lys Leu Met Ile	
100 105	
caa ggg gtg atc cag aag atc gcg ggc ccg gcg gtg atc gcc aag ggc	387
Gln Gly Val Ile Gln Lys Ile Ala Gly Pro Ala Val Ile Ala Lys Gly	
110 115 120	
atg ctc ggg gcc cgc atg tac gac atc tgc aag gtg ggc gaa gag ggc	435
Met Leu Gly Ala Arg Met Tyr Asp Ile Cys Lys Val Gly Glu Glu Gly	
125 130 135 140	
ctc gtg ggc gag atc atc cgc ctg gac ggg gac acg gcc ttc gtc cag	483
Leu Val Gly Glu Ile Ile Arg Leu Asp Gly Asp Thr Ala Phe Val Gln	
145 150 155	
gtc tac gag gac acc tgc ggc cta aag gtg ggg gag ccc gtg gtc tcc	531
Val Tyr Glu Asp Thr Ser Gly Leu Lys Val Gly Glu Pro Val Val Ser	
160 165 170	
acg ggg ctt ccc ttg gcg gtg gag ctc ggc ccc ggg atg ctg aac ggc	579
Thr Gly Leu Pro Leu Ala Val Glu Leu Gly Pro Gly Met Leu Asn Gly	

175	180	185	
atc tac gac ggc atc cag cgc ccc ctg gag cgc atc cgg gag aag acg Ile Tyr Asp Gly Ile Gln Arg Pro Leu Glu Arg Ile Arg Glu Lys Thr 190 195 200			627
ggg atc tac atc acc cgg ggc gtg gtg gtc cac gcc ctg gac cgg gag Gly Ile Tyr Ile Thr Arg Gly Val Val Val His Ala Leu Asp Arg Glu 205 210 215 220			675
aag aag tgg gcc tgg acg ccc atg gtc aag ccc ggg gac gag gtg cgg Lys Lys Trp Ala Trp Thr Pro Met Val Lys Pro Gly Asp Glu Val Arg 225 230 235			723
ggg ggt atg gtc ctg ggc acg gtg ccc gag ttc ggc ttc acc cac aag Gly Gly Met Val Leu Gly Thr Val Pro Glu Phe Gly Phe Thr His Lys 240 245 250			771
atc ctg gta ccc ccg gac gtg cgg ggc cgg gtc aag gag gtg aag ccc Ile Leu Val Pro Pro Asp Val Arg Gly Arg Val Lys Glu Val Lys Pro 255 260 265			819
gcc ggg gag tac acc gtg gag gag ccg gtg gtg gtc ctc gag gac ggc Ala Gly Glu Tyr Thr Val Glu Glu Pro Val Val Val Leu Glu Asp Gly 270 275 280			867
acc gag ctc aag atg tac cac acc tgg ccc gtt cgc cgg gcg agg ccc Thr Glu Leu Lys Met Tyr His Thr Trp Pro Val Arg Arg Ala Arg Pro 285 290 295 300			915
gtg caa agg aag ctt gac ccc aac acc ccc ttc ctc acg ggg atg cgc Val Gln Arg Lys Leu Asp Pro Asn Thr Pro Phe Leu Thr Gly Met Arg 305 310 315			963
atc ctg gac gtc ctc ttc ccc gtg gcc atg ggg ggc acc gcc gcc atc Ile Leu Asp Val Leu Phe Pro Val Ala Met Gly Gly Thr Ala Ala Ile 320 325 330			1011
cct ggg ccc ttc ggc agc ggc aag acc gtg acc cag cag tcc ctg gcc Pro Gly Pro Phe Gly Ser Gly Lys Thr Val Thr Gln Gln Ser Leu Ala 335 340 345			1059
aag tgg tcc aac gcc gac gtg gtg gtc tac gtg ggc tgc ggg gag cgg			1107

Lys Trp Ser Asn Ala Asp Val Val Val Tyr Val Gly Cys Gly Glu Arg	
350	360
ggg aac gag atg acc gac gtg ctc gtg gag ttc ccc gag ctc acc gac	1155
Gly Asn Glu Met Thr Asp Val Leu Val Glu Phe Pro Glu Leu Thr Asp	
365	380
ccc aag acg ggg ggg ccc ttg atg cac cgc acc gtc ctc atc gcc aac	1203
Pro Lys Thr Gly Gly Pro Leu Met His Arg Thr Val Leu Ile Ala Asn	
385	395
acc tcc aac atg ccc gtg gcc gcc cgc gag gcc agc atc tac gtg ggc	1251
Thr Ser Asn Met Pro Val Ala Ala Arg Glu Ala Ser Ile Tyr Val Gly	
400	410
gtg acc atc gcc gag tac ttc cgc gac cag ggc ttc tcc gtg gcc ctc	1299
Val Thr Ile Ala Glu Tyr Phe Arg Asp Gln Gly Phe Ser Val Ala Leu	
415	425
atg gcc gac tcc acg agc cgc tgg gcc gag gct ttg cgc gag atc tct	1347
Met Ala Asp Ser Thr Ser Arg Trp Ala Glu Ala Leu Arg Glu Ile Ser	
430	440
agc cgc ctc gag gag atg ccc gcc gag gag ggc tac ccg ccc tac ctc	1395
Ser Arg Leu Glu Glu Met Pro Ala Glu Glu Gly Tyr Pro Pro Tyr Leu	
445	460
gcc gcc agg ctc gcc gcc ttc tac gag cgg gcg ggc aag gtc atc acc	1443
Ala Ala Arg Leu Ala Ala Phe Tyr Glu Arg Ala Gly Lys Val Ile Thr	
465	475
ctg ggc ggc gag gag ggg gcg gtg acc atc gtg ggg gcc gtc tcc ccg	1491
Leu Gly Gly Glu Glu Gly Ala Val Thr Ile Val Gly Ala Val Ser Pro	
480	490
ccg ggc ggc gac atg tcc gag ccc gtg acc cag tcc acc ttg agg atc	1539
Pro Gly Gly Asp Met Ser Glu Pro Val Thr Gln Ser Thr Leu Arg Ile	
495	505
gtg ggg gcc ttc tgg cgg ctt gac gcc tcc ctg gcc ttc cgc cgc cac	1587
Val Gly Ala Phe Trp Arg Leu Asp Ala Ser Leu Ala Phe Arg Arg His	
510	520

tac atc tcg ggg cct ctt ctc ttc gtg gag aac gcc aag gac ctg gcc	2164
Tyr Ile Ser Gly Pro Leu Leu Phe Val Glu Asn Ala Lys Asp Leu Ala	
700 705 710	
tac ggg gcc atc gtg gac atc aag gac ggc acg ggc cgg gtc cgc ggc	2212
Tyr Gly Ala Ile Val Asp Ile Lys Asp Gly Thr Gly Arg Val Arg Gly	
715 720 725	
ggc cag gtg att gag gtc tcc gag gag tac gcc gtc atc cag gtg ttt	2260
Gly Gln Val Ile Glu Val Ser Glu Glu Tyr Ala Val Ile Gln Val Phe	
730 735 740	
gag gaa acc act ggg ctg gac ctg gcc acg acc agc gtg agc ctg gtg	2308
Glu Glu Thr Thr Gly Leu Asp Leu Ala Thr Thr Ser Val Ser Leu Val	
745 750 755 760	
gag gac gtg gcc cgg ctt ggg gtc tcc aag gag atg ctg ggc cgc cgc	2356
Glu Asp Val Ala Arg Leu Gly Val Ser Lys Glu Met Leu Gly Arg Arg	
765 770 775	
ttc aac ggc atc ggc aag ccc ata gac ggc ctg ccg ccc atc acc ccg	2404
Phe Asn Gly Ile Gly Lys Pro Ile Asp Gly Leu Pro Pro Ile Thr Pro	
780 785 790	
gag aag cgg ctc ccc atc acc ggc ctt ccc tta aac ccc gtg gcc cgg	2452
Glu Lys Arg Leu Pro Ile Thr Gly Leu Pro Leu Asn Pro Val Ala Arg	
795 800 805	
agg aag ccg gag cag ttc atc cag acg ggc atc tcc acc att gac gtg	2500
Arg Lys Pro Glu Gln Phe Ile Gln Thr Gly Ile Ser Thr Ile Asp Val	
810 815 820	
atg aac acc ctg gtc cgg ggg cag aag ctt ccc atc ttc tcc ggc tcg	2548
Met Asn Thr Leu Val Arg Gly Gln Lys Leu Pro Ile Phe Ser Gly Ser	
825 830 835 840	
ggg ctt ccc gcc aac gag atc gcc gcc cag atc gcc cgc cag gcc acg	2596
Gly Leu Pro Ala Asn Glu Ile Ala Ala Gln Ile Ala Arg Gln Ala Thr	
845 850 855	
gtg cgc ccc gac ctc tcc ggg gag ggg gag aag gag gag ccc ttc gcc	2644
Val Arg Pro Asp Leu Ser Gly Glu Gly Glu Lys Glu Glu Pro Phe Ala	

860	865	870	
gtg gtc ttc gcc gcc atg ggg atc acg cag cgg gag ctc tcc tac ttc			2692
Val Val Phe Ala Ala Met Gly Ile Thr Gln Arg Glu Leu Ser Tyr Phe			
875	880	885	
atc cag gag ttt gag cgc acc ggg gcc ctg agc cgc tcc gtc ctc ttc			2740
Ile Gln Glu Phe Glu Arg Thr Gly Ala Leu Ser Arg Ser Val Leu Phe			
890	895	900	
ctg aac aag gcg gac gac ccc acc att gag cgc atc ctc acc ccc cgc			2788
Leu Asn Lys Ala Asp Asp Pro Thr Ile Glu Arg Ile Leu Thr Pro Arg			
905	910	915	920
atg gcc ctc acc gtg gcc gag tac ctg gcc ttt gag cac gac tac cac			2836
Met Ala Leu Thr Val Ala Glu Tyr Leu Ala Phe Glu His Asp Tyr His			
925	930	935	
gtc ctc gtc atc ctc acg gac atg acc aac tac tgc gag gcc ttg cgg			2884
Val Leu Val Ile Leu Thr Asp Met Thr Asn Tyr Cys Glu Ala Leu Arg			
940	945	950	
gag atc ggg gcc gcc cgc gag gag atc ccg ggc cgc cgc ggt tac ccc			2932
Glu Ile Gly Ala Ala Arg Glu Glu Ile Pro Gly Arg Arg Gly Tyr Pro			
955	960	965	
ggc tac atg tac acc gac ctg gcc acc atc tac gag cgc gcc ggg gtg			2980
Gly Tyr Met Tyr Thr Asp Leu Ala Thr Ile Tyr Glu Arg Ala Gly Val			
970	975	980	
gtg gag ggg aag aag ggg agc gtg acc cag atc ccc atc ctc tcc atg			3028
Val Glu Gly Lys Lys Gly Ser Val Thr Gln Ile Pro Ile Leu Ser Met			
985	990	995	1000
ccc gac gac gac cgc acc cac ccc atc ccc gac ctc acg ggc tac atc			3076
Pro Asp Asp Asp Arg Thr His Pro Ile Pro Asp Leu Thr Gly Tyr Ile			
1005	1010	1015	
acc gag ggg cag atc cag ctc tcc cgg gag ctc cac cgc aag ggc atc			3124
Thr Glu Gly Gln Ile Gln Leu Ser Arg Glu Leu His Arg Lys Gly Ile			
1020	1025	1030	
tac ccg ccc att gac ccc ttg ccc tcc ctc tcc cgg ctc atg aac aac			3172

Tyr Pro Pro Ile Asp Pro Leu Pro Ser Leu Ser Arg Leu Met Asn Asn	
1035 1040 1045	
ggc gtg ggc aag ggc aag acc cgg gag gac cac aag cag gtc tcc gac	3220
Gly Val Gly Lys Gly Lys Thr Arg Glu Asp His Lys Gln Val Ser Asp	
1050 1055 1060	
cag ctc tac tcc gcc tac gcc aac ggg gtg gac atc cgg aag ctc gtg	3268
Gln Leu Tyr Ser Ala Tyr Ala Asn Gly Val Asp Ile Arg Lys Leu Val	
1065 1070 1075 1080	
gcc atc atc ggc gag gac gcc ctc acg gag aac gac cgc cgt tac ctc	3316
Ala Ile Ile Gly Glu Asp Ala Leu Thr Glu Asn Asp Arg Arg Tyr Leu	
1085 1090 1095	
cag ttc gcc gac gcc ttt gaa cgg ttc ttc atc aac cag ggg cag cag	3364
Gln Phe Ala Asp Ala Phe Glu Arg Phe Phe Ile Asn Gln Gly Gln Gln	
1100 1105 1110	
aac cgc tcc att gag gag agc ctg cag atc gcc tgg gcc ctc ctc tcc	3412
Asn Arg Ser Ile Glu Glu Ser Leu Gln Ile Ala Trp Ala Leu Leu Ser	
1115 1120 1125	
atg ctg ccc cag ggc gag ctc aag cgc atc tcc aag gac cac atc ggc	3460
Met Leu Pro Gln Gly Glu Leu Lys Arg Ile Ser Lys Asp His Ile Gly	
1130 1135 1140	
aag tac tac ggc cag aag ctg gag gag atc tgg ggc gcg ccc cag gcc	3508
Lys Tyr Tyr Gly Gln Lys Leu Glu Glu Ile Trp Gly Ala Pro Gln Ala	
1145 1150 1155 1160	
ctg gac taagggaggg tag atg agc cag gtg agc ccc acc cgg atg aac	3557
Leu Asp Met Ser Gln Val Ser Pro Thr Arg Met Asn	
1165 1170	
ctt ctg cag agg cgg ggg cag ctc cgc ctg gcg cag aag ggg gtg gac	3605
Leu Leu Gln Arg Arg Gly Gln Leu Arg Leu Ala Gln Lys Gly Val Asp	
1175 1180 1185	
ctc ctc aag aag aag cgg gac gcc ctg gtg gcc gag ttc ttc ggc ctg	3653
Leu Leu Lys Lys Lys Arg Asp Ala Leu Val Ala Glu Phe Phe Gly Leu	
1190 1195 1200	

gtg cgg gag gcc atg gag gcc agg aag gcc ctg gac cag gcg gcc aag	3701
Val Arg Glu Ala Met Glu Ala Arg Lys Ala Leu Asp Gln Ala Ala Lys	
1205 1210 1215 1220	
 gag gcc tac gcc gcc ctc ctc ctg gcc cag gcc ttt gac ggg ccg gag	3749
Glu Ala Tyr Ala Ala Leu Leu Leu Ala Gln Ala Phe Asp Gly Pro Glu	
1225 1230 1235	
 gtg gtg gcg ggg gcg gcc ctt ggg gtc ccg ccc ctc gag ggg gtg gag	3797
Val Val Ala Gly Ala Ala Leu Gly Val Pro Pro Leu Glu Gly Val Glu	
1240 1245 1250	
 gcg gag gtg gag aac gtc tgg ggg agc aag gtg ccg agg ctc aag gcc	3845
Ala Glu Val Glu Asn Val Trp Gly Ser Lys Val Pro Arg Leu Lys Ala	
1255 1260 1265	
 acc ttc ccc gac ggg gcc ctc ctt tcc ccg gtg ggg acc ccg gcc tac	3893
Thr Phe Pro Asp Gly Ala Leu Leu Ser Pro Val Gly Thr Pro Ala Tyr	
1270 1275 1280	
 acc ctc gag gcc agc cgg gcc ttc cgc cgc tac gcc gag gcc ctg atc	3941
Thr Leu Glu Ala Ser Arg Ala Phe Arg Arg Tyr Ala Glu Ala Leu Ile	
1285 1290 1295 1300	
 cgg gtg gcc aac acc gag acc cgc ctg aag aag atc ggg gag gag atc	3989
Arg Val Ala Asn Thr Glu Thr Arg Leu Lys Lys Ile Gly Glu Glu Ile	
1305 1310 1315	
 aag aag acc acg cgg cgg gtg aac gcc ctg gag cag gtg gtg atc ccg	4037
Lys Lys Thr Thr Arg Arg Val Asn Ala Leu Glu Gln Val Val Ile Pro	
1320 1325 1330	
 ggg atc cgc gcc cag atc cgc ttc atc cag cag gtc ctg gag cag cgg	4085
Gly Ile Arg Ala Gln Ile Arg Phe Ile Gln Gln Val Leu Glu Gln Arg	
1335 1340 1345	
 gaa cgg gag gac acc ttc cgc ctc aag cgc atc aag ggc aag att gag	4133
Glu Arg Glu Asp Thr Phe Arg Leu Lys Arg Ile Lys Gly Lys Ile Glu	
1350 1355 1360	
 gcc cgg gag gcc gag gag gag ggc ggc cgg ccc aac ccg cag gtg gag	4181
Ala Arg Glu Ala Glu Glu Glu Gly Gly Arg Pro Asn Pro Gln Val Glu	
1365 1370 1375 1380	

atc ggg gcg ggc ctt taa

4199

Ile Gly Ala Gly Leu

1385

<210> 2

<211> 106

<212> PRT

<213> *Thermus thermophilus*

<400> 2

Val Arg Met Ala Val Ile Ala Asp Pro Glu Thr Ala Gln Gly Phe Arg

1

5

10

15

Leu Ala Gly Leu Glu Gly Tyr Gly Ala Ser Ser Ala Glu Glu Ala Gln

20

25

30

Ser Leu Leu Glu Thr Leu Val Glu Arg Gly Gly Tyr Ala Leu Val Ala

35

40

45

Val Asp Glu Ala Leu Leu Pro Asp Pro Glu Arg Ala Val Glu Arg Leu

50

55

60

Met Arg Gly Arg Asp Leu Pro Val Leu Leu Pro Ile Ala Gly Leu Lys

65

70

75

80

Glu Ala Phe Gln Gly His Asp Val Glu Gly Tyr Met Arg Glu Leu Val

85

90

95

Arg Lys Thr Ile Gly Phe Asp Ile Lys Leu

100

105

<210> 3

<211> 578

<212> PRT

<213> *Thermus thermophilus*

<400> 3

Met Ile Gln Gly Val Ile Gln Lys Ile Ala Gly Pro Ala Val Ile Ala

1

5

10

15

Lys Gly Met Leu Gly Ala Arg Met Tyr Asp Ile Cys Lys Val Gly Glu

20

25

30

Glu Gly Leu Val Gly Glu Ile Ile Arg Leu Asp Gly Asp Thr Ala Phe

35

40

45

Val Gln Val Tyr Glu Asp Thr Ser Gly Leu Lys Val Gly Glu Pro Val

50

55

60

Val Ser Thr Gly Leu Pro Leu Ala Val Glu Leu Gly Pro Gly Met Leu

65		70		75		80
Asn Gly Ile Tyr Asp Gly Ile Gln Arg Pro Leu Glu Arg Ile Arg Glu						
	85		90		95	
Lys Thr Gly Ile Tyr Ile Thr Arg Gly Val Val Val His Ala Leu Asp						
	100		105		110	
Arg Glu Lys Lys Trp Ala Trp Thr Pro Met Val Lys Pro Gly Asp Glu						
	115		120		125	
Val Arg Gly Gly Met Val Leu Gly Thr Val Pro Glu Phe Gly Phe Thr						
	130		135		140	
His Lys Ile Leu Val Pro Pro Asp Val Arg Gly Arg Val Lys Glu Val						
145		150		155		160
Lys Pro Ala Gly Glu Tyr Thr Val Glu Glu Pro Val Val Val Leu Glu						
	165		170		175	
Asp Gly Thr Glu Leu Lys Met Tyr His Thr Trp Pro Val Arg Arg Ala						
	180		185		190	
Arg Pro Val Gln Arg Lys Leu Asp Pro Asn Thr Pro Phe Leu Thr Gly						
	195		200		205	
Met Arg Ile Leu Asp Val Leu Phe Pro Val Ala Met Gly Gly Thr Ala						
	210		215		220	
Ala Ile Pro Gly Pro Phe Gly Ser Gly Lys Thr Val Thr Gln Gln Ser						
225		230		235		240
Leu Ala Lys Trp Ser Asn Ala Asp Val Val Val Tyr Val Gly Cys Gly						
	245		250		255	
Glu Arg Gly Asn Glu Met Thr Asp Val Leu Val Glu Phe Pro Glu Leu						
	260		265		270	
Thr Asp Pro Lys Thr Gly Gly Pro Leu Met His Arg Thr Val Leu Ile						
	275		280		285	
Ala Asn Thr Ser Asn Met Pro Val Ala Ala Arg Glu Ala Ser Ile Tyr						
	290		295		300	
Val Gly Val Thr Ile Ala Glu Tyr Phe Arg Asp Gln Gly Phe Ser Val						
305		310		315		320
Ala Leu Met Ala Asp Ser Thr Ser Arg Trp Ala Glu Ala Leu Arg Glu						
	325		330		335	
Ile Ser Ser Arg Leu Glu Glu Met Pro Ala Glu Glu Gly Tyr Pro Pro						
	340		345		350	
Tyr Leu Ala Ala Arg Leu Ala Ala Phe Tyr Glu Arg Ala Gly Lys Val						
	355		360		365	
Ile Thr Leu Gly Gly Glu Glu Gly Ala Val Thr Ile Val Gly Ala Val						
	370		375		380	
Ser Pro Pro Gly Gly Asp Met Ser Glu Pro Val Thr Gln Ser Thr Leu						
385		390		395		400
Arg Ile Val Gly Ala Phe Trp Arg Leu Asp Ala Ser Leu Ala Phe Arg						
	405		410		415	

Arg His Phe Pro Ala Ile Asn Trp Asn Gly Ser Tyr Ser Leu Phe Thr
 420 425 430
 Ser Ala Leu Asp Pro Trp Tyr Arg Glu Asn Val Ala Glu Asp Tyr Pro
 435 440 445
 Glu Leu Arg Asp Ala Ile Ser Glu Leu Leu Gln Arg Glu Ala Gly Leu
 450 455 460
 Gln Glu Ile Val Gln Leu Val Gly Pro Asp Ala Leu Gln Asp Ala Glu
 465 470 475 480
 Arg Leu Val Ile Glu Val Gly Arg Ile Ile Arg Glu Asp Phe Leu Gln
 485 490 495
 Gln Asn Ala Tyr His Glu Val Asp Ala Tyr Cys Ser Met Lys Lys Ala
 500 505 510
 Tyr Gly Ile Met Lys Met Ile Leu Ala Phe Tyr Lys Glu Ala Glu Ala
 515 520 525
 Ala Ile Lys Arg Gly Val Ser Ile Asp Glu Ile Leu Gln Leu Pro Val
 530 535 540
 Leu Glu Arg Ile Gly Arg Ala Arg Tyr Val Ser Glu Glu Glu Phe Pro
 545 550 555 560
 Ala Tyr Phe Glu Glu Ala Met Lys Glu Ile Gln Gly Ala Phe Lys Ala
 565 570 575
 Leu Ala

<210> 4
 <211> 478
 <212> PRT
 <213> *Thermus thermophilus*

<400> 4
 Met Asp Leu Leu Lys Lys Glu Tyr Thr Gly Ile Thr Tyr Ile Ser Gly
 1 5 10 15
 Pro Leu Leu Phe Val Glu Asn Ala Lys Asp Leu Ala Tyr Gly Ala Ile
 20 25 30
 Val Asp Ile Lys Asp Gly Thr Gly Arg Val Arg Gly Gly Gln Val Ile
 35 40 45
 Glu Val Ser Glu Glu Tyr Ala Val Ile Gln Val Phe Glu Glu Thr Thr
 50 55 60
 Gly Leu Asp Leu Ala Thr Thr Ser Val Ser Leu Val Glu Asp Val Ala
 65 70 75 80
 Arg Leu Gly Val Ser Lys Glu Met Leu Gly Arg Arg Phe Asn Gly Ile
 85 90 95
 Gly Lys Pro Ile Asp Gly Leu Pro Pro Ile Thr Pro Glu Lys Arg Leu
 100 105 110

Pro Ile Thr Gly Leu Pro Leu Asn Pro Val Ala Arg Arg Lys Pro Glu
 115 120 125
 Gln Phe Ile Gln Thr Gly Ile Ser Thr Ile Asp Val Met Asn Thr Leu
 130 135 140
 Val Arg Gly Gln Lys Leu Pro Ile Phe Ser Gly Ser Gly Leu Pro Ala
 145 150 155 160
 Asn Glu Ile Ala Ala Gln Ile Ala Arg Gln Ala Thr Val Arg Pro Asp
 165 170 175
 Leu Ser Gly Glu Gly Glu Lys Glu Glu Pro Phe Ala Val Val Phe Ala
 180 185 190
 Ala Met Gly Ile Thr Gln Arg Glu Leu Ser Tyr Phe Ile Gln Glu Phe
 195 200 205
 Glu Arg Thr Gly Ala Leu Ser Arg Ser Val Leu Phe Leu Asn Lys Ala
 210 215 220
 Asp Asp Pro Thr Ile Glu Arg Ile Leu Thr Pro Arg Met Ala Leu Thr
 225 230 235 240
 Val Ala Glu Tyr Leu Ala Phe Glu His Asp Tyr His Val Leu Val Ile
 245 250 255
 Leu Thr Asp Met Thr Asn Tyr Cys Glu Ala Leu Arg Glu Ile Gly Ala
 260 265 270
 Ala Arg Glu Glu Ile Pro Gly Arg Arg Gly Tyr Pro Gly Tyr Met Tyr
 275 280 285
 Thr Asp Leu Ala Thr Ile Tyr Glu Arg Ala Gly Val Val Glu Gly Lys
 290 295 300
 Lys Gly Ser Val Thr Gln Ile Pro Ile Leu Ser Met Pro Asp Asp Asp
 305 310 315 320
 Arg Thr His Pro Ile Pro Asp Leu Thr Gly Tyr Ile Thr Glu Gly Gln
 325 330 335
 Ile Gln Leu Ser Arg Glu Leu His Arg Lys Gly Ile Tyr Pro Pro Ile
 340 345 350
 Asp Pro Leu Pro Ser Leu Ser Arg Leu Met Asn Asn Gly Val Gly Lys
 355 360 365
 Gly Lys Thr Arg Glu Asp His Lys Gln Val Ser Asp Gln Leu Tyr Ser
 370 375 380
 Ala Tyr Ala Asn Gly Val Asp Ile Arg Lys Leu Val Ala Ile Ile Gly
 385 390 395 400
 Glu Asp Ala Leu Thr Glu Asn Asp Arg Arg Tyr Leu Gln Phe Ala Asp
 405 410 415
 Ala Phe Glu Arg Phe Phe Ile Asn Gln Gly Gln Gln Asn Arg Ser Ile
 420 425 430
 Glu Glu Ser Leu Gln Ile Ala Trp Ala Leu Leu Ser Met Leu Pro Gln
 435 440 445
 Gly Glu Leu Lys Arg Ile Ser Lys Asp His Ile Gly Lys Tyr Tyr Gly

450 455 460
 Gln Lys Leu Glu Glu Ile Trp Gly Ala Pro Gln Ala Leu Asp
 465 470 475

<210> 5
 <211> 223
 <212> PRT
 <213> *Thermus thermophilus*

<400> 5
 Met Ser Gln Val Ser Pro Thr Arg Met Asn Leu Leu Gln Arg Arg Gly
 1 5 10 15
 Gln Leu Arg Leu Ala Gln Lys Gly Val Asp Leu Leu Lys Lys Lys Arg
 20 25 30
 Asp Ala Leu Val Ala Glu Phe Phe Gly Leu Val Arg Glu Ala Met Glu
 35 40 45
 Ala Arg Lys Ala Leu Asp Gln Ala Ala Lys Glu Ala Tyr Ala Ala Leu
 50 55 60
 Leu Leu Ala Gln Ala Phe Asp Gly Pro Glu Val Val Ala Gly Ala Ala
 65 70 75 80
 Leu Gly Val Pro Pro Leu Glu Gly Val Glu Ala Glu Val Glu Asn Val
 85 90 95
 Trp Gly Ser Lys Val Pro Arg Leu Lys Ala Thr Phe Pro Asp Gly Ala
 100 105 110
 Leu Leu Ser Pro Val Gly Thr Pro Ala Tyr Thr Leu Glu Ala Ser Arg
 115 120 125
 Ala Phe Arg Arg Tyr Ala Glu Ala Leu Ile Arg Val Ala Asn Thr Glu
 130 135 140
 Thr Arg Leu Lys Lys Ile Gly Glu Glu Ile Lys Lys Thr Thr Arg Arg
 145 150 155 160
 Val Asn Ala Leu Glu Gln Val Val Ile Pro Gly Ile Arg Ala Gln Ile
 165 170 175
 Arg Phe Ile Gln Gln Val Leu Glu Gln Arg Glu Arg Glu Asp Thr Phe
 180 185 190
 Arg Leu Lys Arg Ile Lys Gly Lys Ile Glu Ala Arg Glu Ala Glu Glu
 195 200 205
 Glu Gly Gly Arg Pro Asn Pro Gln Val Glu Ile Gly Ala Gly Leu
 210 215 220